2013 REGIONAL AMBIENT FISH TISSUE MONITORING PROGRAM; SUMMARY OF THE IOWA ANALYSES

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Introduction:

To supplement other environmental monitoring programs and to protect the health of people consuming fish from waters within this state, the state of Iowa conducts fish tissue monitoring. Since 1980, the Iowa Department of Natural Resources (IDNR), the United States Environmental Protection Agency Region VII (U.S. EPA), and the State Hygienic Laboratory (SHL) have cooperatively conducted annual statewide collections and analyses of fish for toxic contaminants. Beginning in 1983, this monitoring effort became known as the Regional Ambient Fish Tissue Monitoring Program (RAFT). Currently, the RAFT program is the only statewide fish contaminant-monitoring program in Iowa. Historically, the data generated from the RAFT program have enabled IDNR to document temporal changes in contaminant levels and to identify Iowa lakes and rivers where high levels of contaminants in fish potentially threaten the health of fish-consuming Iowans (see IDNR 2006). The Iowa RAFT monitoring program incorporates five different types of monitoring sites: 1) status, 2) follow-up, 3) trend, 4) turtle, and 5) random.

Status monitoring:

The majority of RAFT sites are sampled to determine whether the waterbodies meet the “fish consumption” portion of the fishable goal of the federal Clean Water Act. In other words, these sites are used to screen for contamination problems and to determine the water quality "status" of the waterbodies. Analyses for a variety of pesticides, other toxic organic compounds, and metals are conducted on samples of omnivorous bottom-dwelling fish and carnivorous predator fish. Most status sites on rivers and lakes have either never been sampled or have not been sampled within the last five years (rivers) or 10 years (lakes). Staff of the IDNR divisions of Environmental Services and Conservation and Recreation select the status sites. Status monitoring occurs on most types of Iowa waterbodies (interior rivers, border rivers, and manmade and natural lakes) in both rural and urban areas. Lakes and river reaches known to support considerable recreational fishing receive highest priority, but IDNR attempts to sample all lakes and river reaches designated in the *Iowa Water Quality Standards* for recreational fishing. Approximately one-third to one-half of Iowa RAFT status sites are on lakes; the remaining sites are either on interior rivers or on the border rivers (Mississippi, Missouri or Big Sioux rivers).

Follow-up Monitoring:

If the level of a contaminant in a fish tissue sample exceeds IDNR/IDPH advisory trigger levels and/or IDNR levels of concern (Appendix A; IDPH 2007), the RAFT program conducts follow-up monitoring to better define the levels of contaminants. For example, if status monitoring shows that contaminant levels in fish from a waterbody exceed IDNR/IDPH advisory trigger levels, additional samples will be collected as part of follow-up monitoring for the next year’s RAFT program. If follow-up monitoring confirms that levels of contamination exceed the advisory trigger levels for protection of human health, a fish consumption advisory is issued. For more information on consumption advisories see the IDNR RAFT website: http://www.iowadnr.gov/portals/idnr/uploads/fish/fish_consumption_advisories.pdf. If needed, IDNR Fisheries Bureau will conduct follow-up monitoring separately from the RAFT program to verify high levels of contaminants or to better delineate lengths of river consumption advisories. These follow-up samples are collected before the annual RAFT sampling and are analyzed at SHL.

Trend monitoring:

In 1994 U.S. EPA Region VII in cooperation with the Region VII states (Iowa, Kansas, Missouri, and Nebraska), identified sites that would be monitored at regular intervals to determine trends in levels of contamination. One composite sample of three to five common carp from each site is submitted for whole-fish analysis. Whole-fish samples are more likely to contain detectable levels of most contaminants than are fillet samples (edible portions) or tissue plugs. Examination of the trend monitoring results may help identify temporal changes in contaminant concentrations and may expose new contaminants entering the food chain. From 1996-2005, half of the trend sites were sampled on odd years and the other half were sampled in even years. In 2006, due to a change in RAFT program design (U.S. EPA 2006), all 10 trend sites were sampled and will be sampled every other year in the future. The following ten sites are Iowa's part of the RAFT trend monitoring program:

Table 1. IA RAFT trend site locations and sampling history.

site #	RAFT trend site name	county	# samples	first sample date	last sample date
172	Des Moines River at Des Moines	Polk	9	8/17/1995	7/12/2012
173	Des Moines River NNW of Keosauqua	Van Buren	9	8/24/1994	7/19/2012
169	Iowa River E of Wapello	Louisa	9	9/14/1995	9/17/2010
177	Little Sioux River S of Washta	Ida	10	8/9/1994	9/24/2012
175	Maquoketa River NE of Maquoketa	Jackson	10	7/18/1995	8/3/2012
174	Mississippi River at Lansing	Allamakee	10	8/16/1995	10/15/2012
170	Mississippi River at Linwood	Scott	8	8/4/1994	8/20/2012
143	Mississippi River downstream of Dubuque	Dubuque	10	9/15/1994	9/11/2012
171	Skunk River NE of Wever	Lee	8	9/5/1997	9/17/2010
176	Wapsipinicon River SSE of Ground Mound	Scott	8	9/15/1994	8/25/2010

Turtle Monitoring:

In 2009, IDNR fisheries biologists collected snapping turtles from nine Iowa lakes as part of RAFT monitoring to better define contaminant levels in Iowa turtle populations. This monitoring used the left front shoulder muscle tissue from two or three turtles for the composite sample that was submitted for analysis following the same protocol used for fish. The turtle monitoring continued in 2010 at four Iowa lakes, was suspended in 2011 and resumed again in 2012.

Random Monitoring:

In 2006, based on recommendations in U.S. EPA's RAFT workplan (U.S. EPA 2006), Iowa began sampling random sites across the state as part of an effort to determine the current level of contaminants in fish tissue on a statewide basis. The 2006 sampling sites were selected from a previous random sampling project and data were collected only from large interior rivers. In 2007, the sample sites were selected from a random list of smaller public lakes and ponds. Given that U.S. EPA Region VII has recently changed the emphasis of the RAFT program again, the future of random sampling for Iowa fish contaminants is uncertain.

2013 Results:

The 2013 RAFT program in Iowa involved the collection of 127 samples from 26 waterbodies. The high number of samples reflects the switch from fillet predator samples to tissue plug predator samples where the samples are individually analyzed and not composited. In July - October 2013, IDNR fisheries biologists collected, processed and prepared the RAFT samples for shipping. These activities were conducted according to procedures described in the workplan for the Iowa RAFT program (IDNR 2011). Once frozen, samples were transported or shipped to the Ankeny office of the SHL. The frozen tissue samples were stored at the SHL until shipment to the U.S. EPA Region VII laboratory in Kansas City, Kansas. The predatory fish mercury-only samples were shipped to the U.S. EPA Region VII laboratory for analysis in early November 2013. The bottom dwelling fish tissue samples were analyzed at the SHL facility in Ankeny. Samples were analyzed for a variety of contaminants, including pesticides, other toxic organic compounds, and toxic metals (Appendix A). IDNR received results of all sample analyses in January 2014.

Status monitoring in 2013 included the collection of 109 fish samples from 20 sites with 91 of those samples collected from predatory fish and 18 samples collected from bottom feeding fish.

The follow-up monitoring in 2013 involved the collection of 16 predatory fish mercury (Hg) samples from four sites.

There were two softshell turtle status samples collected at two sites in 2013.

The 2013 Iowa RAFT monitoring results for the primary contaminants of concern (mercury, PCBs, dieldrin, and chlordane) are summarized in Tables 2-4 and in Figures 1-3. In addition, appendices D and E contain all the sampling data generated by the Iowa portion of the 2013 RAFT program.

With the exception of mercury, the vast majority of contaminant levels in the 2013 IA RAFT samples were low or not detected (Tables 2-4 and in Figures 1-3). These results are currently being addressed by IDNR Fisheries bureau with the assistance of the IDNR Watershed Monitoring and Assessment section and the Iowa Department of Public Health.

Table 2. Summary of 2013 IA RAFT mercury (Hg) status site sampling results from predatory fish. All samples were tissue plugs and Hg results are in mg/kg (or ppm). See Appendix C for explanation of species codes.

site #	RAFT site name	county	date	species code	# fish	Hg ave	Hg st dev	Hg max	Hg min
282	Avenue of the Saints Lake	Bremer	8/29/2013	LMB	4	0.786	0.267	0.904	0.600
285	Brushy Creek Lake	Webster	8/29/2013	LMB	5	0.232	0.150	0.479	0.089
294	Diamond Lake	Poweshiek	7/31/2013	LMB	5	0.124	0.057	0.225	0.090
302	Hickory Grove Lake	Story	9/16/2013	LMB	5	0.239	0.055	0.304	0.164
306	Kent Park Lake	Johnson	8/9/2013	LMB	5	0.107	0.028	0.152	0.077
310	Lake Smith	Kossuth	7/31/2013	LMB	5	0.248	0.020	0.275	0.228
312	Lake Wapello	Davis	8/1/2013	LMB	5	1.212	0.127	1.340	1.020
269	Meadow Lake	Adair	8/13/2013	LMB	5	0.576	0.219	0.952	0.382
161	Mississippi River - Mud Lake near Dubuque	Dubuque	10/3/2013	LMB	5	0.165	0.042	0.199	0.092
350	Mississippi River at Bellevue	Jackson	9/11/2013	WHB	5	0.193	0.086	0.337	0.121
47	Mississippi River at Davenport	Scott	8/14/2013	LMB	3	0.241	0.097	0.350	0.165
109	Mississippi River at Keokuk	Lee	8/12/2013	FRD	5	0.210	0.073	0.289	0.120
206	Mississippi River at Marquette/McGregor	Clayton	10/2/2013	LMB	5	0.263	0.100	0.374	0.174
102	Mississippi River downstream of Burlington	Des Moines	8/22/2013	LMB	5	0.329	0.113	0.507	0.234
114	Missouri River at Council Bluffs	Pottawattamie	8/1/2013	FCF	4	0.247	0.084	0.292	0.230
150	Missouri River W of Sergeant Bluff	Woodbury	8/8/2013	FCF	5	0.301	0.108	0.426	0.182
270	Pollmiller Park Lake	Lee	9/25/2013	LMB	5	0.487	0.082	0.582	0.392
326	Rock Creek Lake	Jasper	9/16/2013	LMB	5	0.116	0.029	0.157	0.086
340	West Osceola	Clarke	8/15/2013	LMB	5	0.253	0.069	0.330	0.157

Table 3. Summary of 2013 IA RAFT mercury (Hg) follow-up site sampling results from predatory fish. All samples were tissue plugs and Hg results are in mg/kg (or ppm). See Appendix C for explanation of species codes.

site #	RAFT site name	county	date	species code	# fish	Hg ave	Hg st dev	Hg max	Hg min
148	Chariton River N of Centerville	Appanoose	7/31/2013	WHC	5	0.195	0.079	0.286	0.075
196	NF Maquoketa River ds from Cascade	Jones	9/11/2013	SMB	5	0.204	0.080	0.315	0.100
40	North Raccoon River NW of Jefferson	Greene	8/30/2013	WAE	3	0.203	0.143	0.368	0.119
202	Turkey River E of Clermont	Fayette	8/30/2013	SMB	3	0.274	0.135	0.430	0.189

Table 4. Summary of 2013 IA RAFT status site sampling for contaminants of concern in bottom-feeding fish and turtles. All fish samples were composited fillets and results are in mg/kg (or ppm). The turtle samples were shoulder muscle composites and the results are also in mg/kg (or ppm). See Appendix C for explanation of species codes.

site #	RAFT site name	county	date	species code	# fish	technical chlordane	Dieldrin	sum PCBs[1]	Hg[2]
282	Avenue of the Saints Lake	Bremer	8/29/2013	CAP	4	<0.2	<0.04	<0.6	0.1
349	Big Sioux River, Millsite Access near Westfield	Plymouth	9/10/2013	CCF	5	<0.2	<0.04	<0.6	0.08
285	Brushy Creek Lake	Webster	8/29/2013	CCF	3	<0.2	<0.04	<0.6	<0.05
189	Des Moines River near Croton	Lee	8/29/2013	SOFT	3	<0.2	<0.04	<0.6	0.09
294	Diamond Lake	Poweshiek	7/31/2013	CCF	5	<0.2	<0.04	<0.6	0.05
302	Hickory Grove Lake	Story	8/2/2013	CCF	5	<0.2	<0.04	<0.6	0.09
306	Kent Park Lake	Johnson	8/9/2013	CCF	3	<0.2	<0.04	<0.6	<0.05
310	Lake Smith	Kossuth	7/31/2013	CCF	4	<0.2	<0.04	<0.6	0.06
312	Lake Wapello	Davis	8/1/2013	CCF	5	<0.2	<0.04	<0.6	0.13
269	Meadow Lake	Adair	7/26/2013	CCF	5	<0.2	<0.04	<0.6	<0.05
350	Mississippi River at Bellevue	Jackson	9/11/2013	CCF	5	<0.2	<0.04	<0.6	0.07
47	Mississippi River at Davenport	Scott	8/14/2013	CAP	5	<0.2	<0.04	<0.6	0.1
109	Mississippi River at Keokuk	Lee	8/12/2013	CAP	5	<0.2	<0.04	<0.6	0.13
102	Mississippi River downstream of Burlington	Des Moines	8/22/2013	CCF	5	<0.2	<0.04	<0.6	0.13
114	Missouri River at Council Bluffs	Pottawattamie	8/20/2013	CCF	4	<0.2	<0.04	<0.6	0.13
150	Missouri River W of Sergeant Bluff	Woodbury	8/29/2013	CCF	3	<0.2	<0.04	<0.6	0.11
270	Pollmiller Park Lake	Lee	9/25/2013	CAP	3	<0.2	<0.04	<0.6	0.22
326	Rock Creek Lake	Jasper	10/2/2013	CCF	3	<0.2	<0.04	<0.6	<0.05
101	Skunk River N of Brighton	Washington	8/27/2013	SOFT	3	<0.2	<0.04	<0.6	0.44
340	West Osceola	Clarke	8/15/2013	CCF	5	<0.2	<0.04	<0.15	<0.05

[1] sum PCBs = Aroclor 1248 + Aroclor 1254 + Aroclor 1260; Due to the analytical methods used for PCBs, detection levels of the three Aroclors (<0.2 mg/kg) were equal to the IDNR/IDPH advisory trigger level. Thus, for a given sample, the sum of the detection levels for the three Aroclors to determine the "total PCB" concentration (<0.6 mg/kg for all but sample 1539) appears well above the 1 meal/week advisory trigger level of 0.2 mg/kg. IDNR will address this laboratory analysis issue for future RAFT samplings.

[2] Hg = mercury

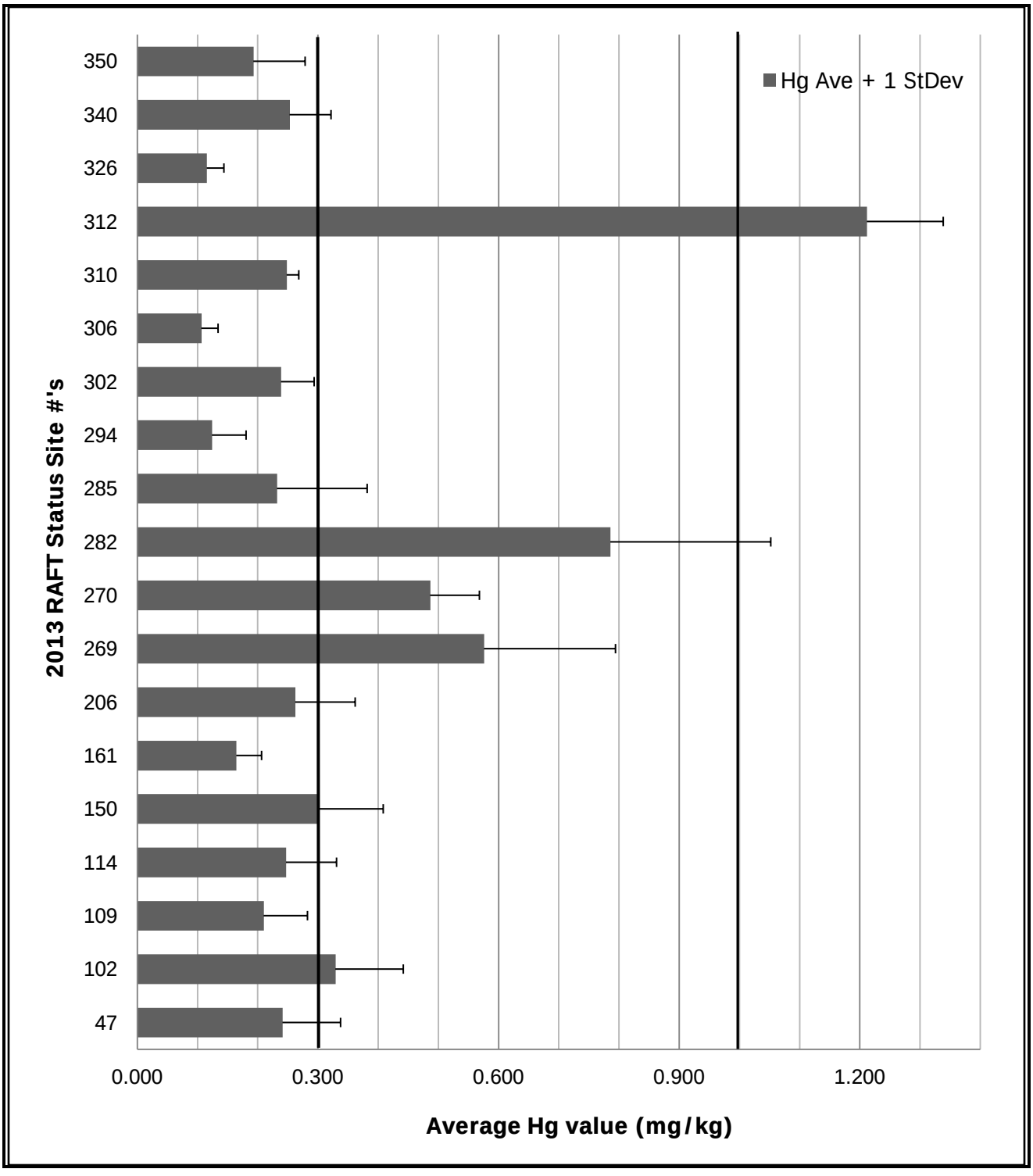

Figure 1. 2013 IA RAFT mercury status sample results for predatory fish. All samples were tissue plugs and results are in mg/kg (or ppm). All of the values above 0.3 mg/kg have been, or will be, addressed by IDNR through the issuance or continuation of consumption advisories or with follow-up monitoring. See Appendix B for the full list of 2013 RAFT sites.

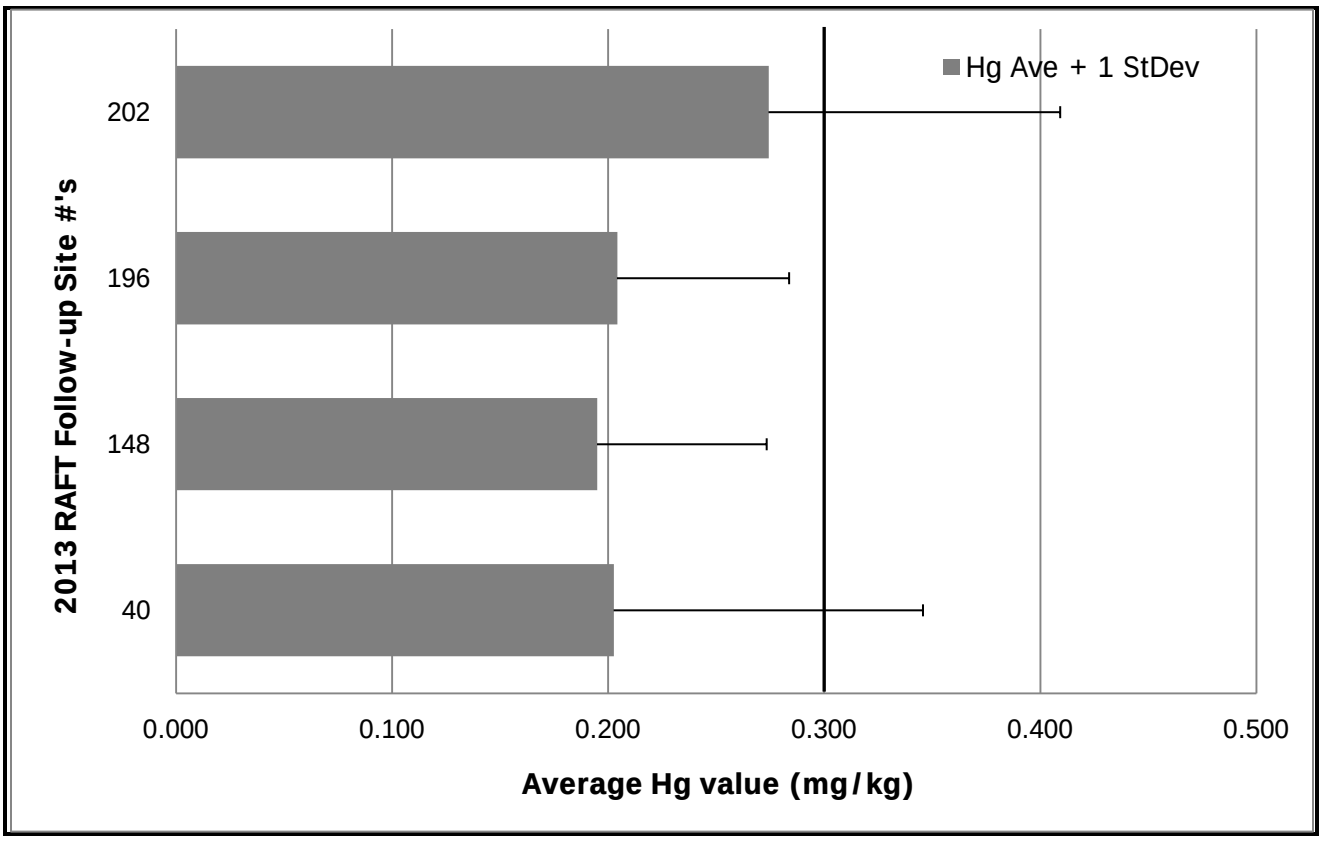

Figure 2. 2013 IA RAFT mercury follow-up sample results for predatory fish. All samples were tissue plugs and results are in mg/kg (or ppm). All of the values above 0.3 mg/kg have been, or will be, addressed by IDNR through the issuance or continuation of consumption advisories or with follow-up monitoring. See Appendix B for the full list of 2013 RAFT sites.

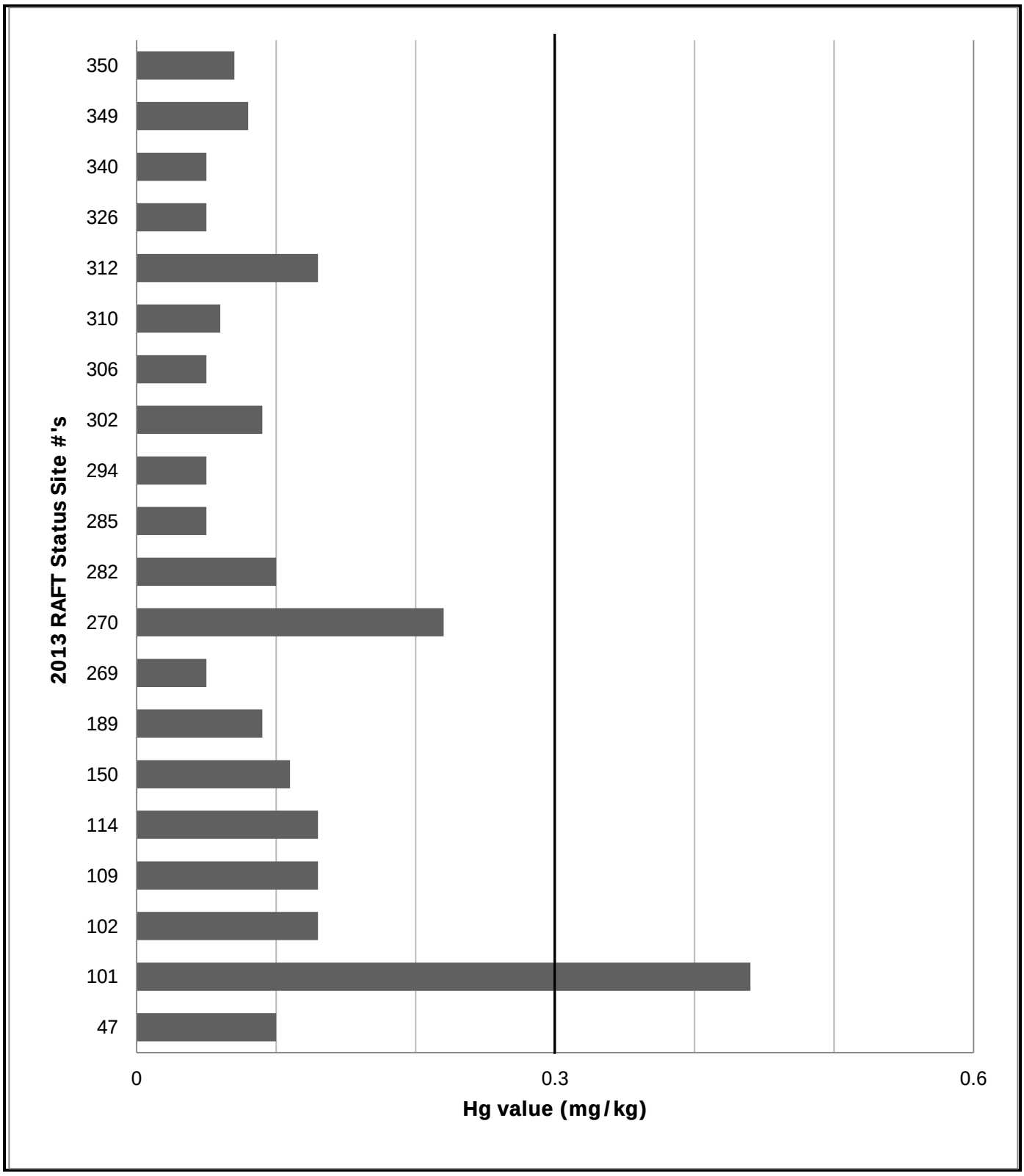

Figure 3. 2013 IA RAFT status bottom-feeding fish and turtle sample results for mercury (in mg/kg or ppm). All samples were composited from fillets of common carp, channel catfish or from shoulder muscle from softshell turtles. See Appendix B for the full list of the 2013 RAFT sites.

References:

IDNR. 2006. Fish tissue monitoring in Iowa. Water Fact Sheet 2006-5. Geological and Water Survey, Iowa Department of Natural Resources. 4 pgs (ftp://ftp.igsb.uiowa.edu/igspubs/pdf/WFS-2006-05.pdf).

IDNR. 2011. Sampling Procedures for the Region VII Ambient Fish Tissue Monitoring Program in Iowa. Geological and Water Survey Bureau, Environmental Services Division, Iowa Department of Natural Resources. 16 pp.

IDPH. 2007. Fish consumption advisory protocol in Iowa. Iowa Department of Public Health. 8 pgs.

U.S. EPA. 2006. EPA Region 7 Regional Ambient Fish Tissue Monitoring Program (RAFTMP) program rationale, design and implementation plans for 2006 - 2010. Environmental Services Division, U.S. Environmental Protection Agency Region 7 and the Region 7 Fish Tissue Monitoring Workgroup. 24 pgs.

Appendix A

Summary of contaminants and respective evaluation criteria for fish tissue samples collected for the Regional Ambient Fish Tissue (RAFT) monitoring program in Iowa.

#	contaminant	EPA Region VII detection levels (ppm[3])	SHL detection levels (ppm)	IDNR/IDPH advisory trigger level (ppm)	IDNR/IDPH advisory meal allowance
1	chlordane, technical	0.03	0.2	0 to 0.6	unrestricted
				>0.6 to <5.0	one meal per week
				≥5.0	do not eat
2	mercury	0.0181	0.05	0 to 0.3	unrestricted
				>0.3 to <1.0	one meal per week
				≥1.0	do not eat
3	PCB, Aroclor 1248	0.04	0.2	sum = 0 to 0.2	unrestricted
4	PCB, Aroclor 1254	0.03	0.2	sum >0.2 to <2.0	one meal per week
5	PCB, Aroclor 1260	0.02	0.2	sum 2.0 and over	do not eat
6	dieldrin	0.003	0.04		
7	chlordane, cis-[1]	0.002			
8	chlordane, trans-[1]	0.002			
9	nonachlor, cis-[1]	0.002			
10	nonachlor, trans-[1]	0.002			
11	oxychlordane[1]	0.002			
12	DDD, 4,4'-	0.004			
13	DDE, 4,4'-	0.005			
14	DDT, 4,4'-	0.005			
15	BHC (lindane)	0.002			
16	cadmium	0.02			
17	heptachlor	0.003			
18	heptachlor epoxide	0.003			
19	hexachlorobenzene	0.001			
20	lead	0.11			
21	mirex[2]	0.003			
22	pentacloroanisole	0.001			
23	pentachlorobenzene[2]	0.001			
24	selenium	0.5			
25	1,2,4,5-tetrachlorobenzene[2]	0.004			
26	trifluralin	0.003			

[1]status samples only

[2]trend samples only

[3]ppm = parts per million and is equivalent to milligrams/kilogram (mg/kg)

Appendix B

Complete listing of the 2013 IA RAFT sampling sites.

site #	RAFT site name	county	waterbody type	NAD 83 UTM Easting	NAD 83 UTM Northing
282	Avenue of the Saints Lake	Bremer	lake	538007	4728426
349	Big Sioux River at Millsite Access near Westfield	Plymouth	river/stream	202833	4740703
285	Brushy Creek Lake	Webster	lake	418535	4694896
148	Chariton River N of Centerville	Appanoose	river/stream	511814	4515492
189	Des Moines River near Croton	Lee	river/stream	610548	4493743
294	Diamond Lake	Poweshiek	lake	537504	4604139
302	Hickory Grove Lake	Story	lake	470625	4648447
306	Kent Park Lake	Johnson	lake	605446	4619937
310	Lake Smith	Kossuth	lake	398861	4775375
312	Lake Wapello	Davis	lake	535962	4518778
269	Meadow Lake	Adair	lake	379691	4582747
161	Mississippi River - Mud Lake near Dubuque	Dubuque	river/stream	688695	4720070
350	Mississippi River at Bellevue	Jackson	river/stream	719322	4693271
47	Mississippi River at Davenport	Scott	river/stream	705520	4600202
109	Mississippi River at Keokuk	Lee	river/stream	637907	4472940
206	Mississippi River at Marquette/McGregor	Clayton	river/stream	648683	4766651
102	Mississippi River downstream of Burlington	Des Moines	river/stream	660460	4514715
114	Missouri River at Council Bluffs	Pottawattamie	river/stream	260105	4563658
150	Missouri River W of Sergeant Bluff	Woodbury	river/stream	218621	4694335
196	North Fork Maquoketa River ds from Cascade	Jones	river/stream	665803	4684481
40	North Raccoon River NW of Jefferson	Greene	river/stream	370002	4661683
270	Pollmiller Park Lake	Lee	lake	632103	4508044
326	Rock Creek Lake	Jasper	lake	512601	4621108
101	Skunk River N of Brighton	Washington	river/stream	599960	4561039
202	Turkey River E of Clermont	Fayette	river/stream	610647	4757895
340	West Osceola	Clarke	lake	432355	4543125

Appendix C

Fish and turtle species table that includes: species codes, common and scientific names, and RAFT species codes.

species code	common name	scientific name	RAFT code
BGB	Bigmouth Buffalo	*Ictiobus cyprinellus*	3
BKB	Black Buffalo	*Ictiobus niger*	105
BLB	Black Bullhead	*Ameiurus melas*	4
BLC	Black Crappie	*Pomoxis nigromaculatus*	5
BLG	Bluegill	*Lepomis macrochirus*	8
BRT	Brown Trout	*Salmo trutta*	11
CCF	Channel Catfish	*Ictalurus punctatus*	16
CAP	Common Carp	*Cyprinus carpio*	12
FCF	Flathead Catfish	*Pylodictis olivaris*	19
FRD	Freshwater Drum	*Aplodinotus grunniens*	20
GOR	Golden Redhorse	*Moxostoma erythrurum*	390
LMB	Largemouth Bass	*Micropterus salmoides*	31
NHS	Northern Hog Sucker	*Hypentelium nigricans*	94
NOP	Northern Pike	*Esox lucius*	36
PAH	Paddlefish	*Polyodon spathula*	106
ULL	Quillback Carpsucker	*Carpiodes cyprinus*	74
RBT	Rainbow Trout	*Oncorhynchus mykiss*	39
RVC	River Carpsucker	*Carpiodes carpio*	42
SAR	Sauger	*Sander canadensis*	46
SHR	Shorthead Redhorse	*Moxostoma macrolepidotum*	192
SHG	Shortnose Gar	*Lepisosteus platostomus*	107
SMB	Smallmouth Bass	*Micropterus dolomieu*	47
SAB	Smallmouth Buffalo	*Ictiobus bubalus*	48
SNAP	Snapping Turtle	*Chelydra serpentina*	n/a
SOFT	Softshell Turtle	*Apalone spp.*	n/a
WAE	Walleye	*Sander vitreus*	55
WHB	White Bass	*Morone chrysops*	57
WHC	White Crappie	*Pomoxis annularis*	59
WHS	White Sucker	*Catostomus commersonii*	61
YLB	Yellow Bass	*Morone mississippiensis*	93
YEB	Yellow Bullhead	*Ameiurus natalis*	62
YEP	Yellow Perch	*Perca flavescens*	63

Appendix D

Complete listing of the 2013 IA RAFT predator fish sampling results. See Appendix B for a list of 2013 RAFT site numbers and Appendix C for a list of fish names and species codes.

sample #	site #	Lab	species code	biopart	sample type	total length (cm)	weight (g)	mercury (mg/kg)
1420	40	EPA	WAE	plug	follow-up	35.8	384	0.119
1421	40	EPA	WAE	plug	follow-up	45.7	824	0.121
1422	40	EPA	WAE	plug	follow-up	55.6	1678	0.368
1423	47	EPA	LMB	plug	status	31	461	0.165
1424	47	EPA	LMB	plug	status	30.2	414	0.209
1425	47	EPA	LMB	plug	status	35.2	672	0.35
1428	102	EPA	LMB	plug	status	38	872	0.276
1429	102	EPA	LMB	plug	status	38.4	876	0.255
1430	102	EPA	LMB	plug	status	36.8	898	0.234
1431	102	EPA	LMB	plug	status	39.2	963	0.374
1432	102	EPA	LMB	plug	status	42.4	1268	0.507
1434	109	EPA	FRD	plug	status	34.7	506	0.188
1435	109	EPA	FRD	plug	status	37.6	751	0.12
1436	109	EPA	FRD	plug	status	36	617	0.289
1437	109	EPA	FRD	plug	status	36	606	0.172
1438	109	EPA	FRD	plug	status	39	610	0.281
1440	114	EPA	FCF	plug	status	50	1181	0.292
1441	114	EPA	FCF	plug	status	52	1519	0.23
1442	114	EPA	FCF	plug	status	43	937	0.234
1443	114	EPA	FCF	plug	status	44	789	0.233
1445	148	EPA	WHC	plug	follow-up	20.8	115	0.185
1446	148	EPA	WHC	plug	follow-up	21.6	110	0.286
1447	148	EPA	WHC	plug	follow-up	21.1	120	0.191
1448	148	EPA	WHC	plug	follow-up	20.3	95	0.0749
1449	148	EPA	WHC	plug	follow-up	20.8	100	0.238
1450	150	EPA	FCF	plug	status	59.7	2457	0.426
1451	150	EPA	FCF	plug	status	55	1701	0.225
1452	150	EPA	FCF	plug	status	61.5	2627	0.402
1453	150	EPA	FCF	plug	status	51.5	19	0.182
1454	150	EPA	FCF	plug	status	49.2	19	0.268
1456	161	EPA	LMB	plug	status	38.4	855	0.188
1457	161	EPA	LMB	plug	status	35.2	708	0.175
1458	161	EPA	LMB	plug	status	35.7	677	0.199
1459	161	EPA	LMB	plug	status	31.6	418	0.169
1460	161	EPA	LMB	plug	status	34.2	572	0.0922
1462	196	EPA	SMB	plug	follow-up	32.3	418	0.237
1463	196	EPA	SMB	plug	follow-up	28.2	355	0.1
1464	196	EPA	SMB	plug	follow-up	35.3	594	0.199
1465	196	EPA	SMB	plug	follow-up	30.5	388	0.17
1466	196	EPA	SMB	plug	follow-up	28.4	238	0.315
1467	202	EPA	SMB	plug	follow-up	39.6	885	0.43
1468	202	EPA	SMB	plug	follow-up	25.7	191	0.204
1469	202	EPA	SMB	plug	follow-up	24.1	174	0.189
1470	206	EPA	LMB	plug	status	29.7	367	0.374
1471	206	EPA	LMB	plug	status	26.8	272	0.367
1472	206	EPA	LMB	plug	status	32.7	528	0.184
1473	206	EPA	LMB	plug	status	32.3	483	0.174

Appendix D, continued.

Complete listing of the 2013 IA RAFT predator fish sampling results.

sample #	site #	Lab	species code	biopart	sample type	total length (cm)	weight (g)	mercury (mg/kg)
1474	206	EPA	LMB	plug	status	28.4	358	0.214
1475	269	EPA	LMB	plug	status	45	1257	0.536
1476	269	EPA	LMB	plug	status	41.4	950	0.52
1477	269	EPA	LMB	plug	status	41.9	958	0.382
1478	269	EPA	LMB	plug	status	41.9	1168	0.49
1479	269	EPA	LMB	plug	status	46	1408	0.952
1481	270	EPA	LMB	plug	status	30.2	357	0.451
1482	270	EPA	LMB	plug	status	30.1	314	0.563
1483	270	EPA	LMB	plug	status	30	323	0.582
1484	270	EPA	LMB	plug	status	29.5	319	0.392
1485	270	EPA	LMB	plug	status	28.3	272	0.445
1487	282	EPA	LMB	plug	status	42.7	1332	0.784
1488	282	EPA	LMB	plug	status	41.2	1096	0.6
1489	282	EPA	LMB	plug	status	43.7	1550	0.904
1490	282	EPA	LMB	plug	status	43.2	1248	0.856
1492	285	EPA	LMB	plug	status	38.1	894	0.249
1493	285	EPA	LMB	plug	status	38.4	92	0.15
1494	285	EPA	LMB	plug	status	37.1	821	0.0889
1495	285	EPA	LMB	plug	status	44.5	1384	0.194
1496	285	EPA	LMB	plug	status	45.5	1131	0.479
1498	294	EPA	LMB	plug	status	36.4	649	0.0902
1499	294	EPA	LMB	plug	status	36.5	671	0.0994
1500	294	EPA	LMB	plug	status	35.9	681	0.0966
1501	294	EPA	LMB	plug	status	34.2	450	0.11
1502	294	EPA	LMB	plug	status	34.9	599	0.225
1504	302	EPA	LMB	plug	status	36.1	636	0.304
1505	302	EPA	LMB	plug	status	30.8	422	0.238
1506	302	EPA	LMB	plug	status	34.3	570	0.278
1507	302	EPA	LMB	plug	status	31.6	432	0.164
1508	302	EPA	LMB	plug	status	31.7	382	0.21
1510	306	EPA	LMB	plug	status	31.2	415	0.0926
1511	306	EPA	LMB	plug	status	31.1	355	0.105
1512	306	EPA	LMB	plug	status	31.2	370	0.0773
1513	306	EPA	LMB	plug	status	34.3	505	0.106
1514	306	EPA	LMB	plug	status	30.6	370	0.152
1516	310	EPA	LMB	plug	status	37	775	0.263
1517	310	EPA	LMB	plug	status	35.8	680	0.228
1518	310	EPA	LMB	plug	status	36.6	785	0.275
1519	310	EPA	LMB	plug	status	38	815	0.232
1520	310	EPA	LMB	plug	status	35.8	625	0.244
1522	312	EPA	LMB	plug	status	42.7	1410	1.16
1523	312	EPA	LMB	plug	status	38.4	1105	1.24
1524	312	EPA	LMB	plug	status	41.1	1370	1.34
1525	312	EPA	LMB	plug	status	43.2	1410	1.02
1526	312	EPA	LMB	plug	status	39.1	985	1.3

Appendix D, continued.

Complete listing of the 2013 IA RAFT predator fish sampling results.

sample #	site #	Lab	species code	biopart	sample type	total length (cm)	weight (g)	mercury (mg/kg)
1528	326	EPA	LMB	plug	status	42.2	1106	0.0864
1529	326	EPA	LMB	plug	status	38.3	816	0.0915
1530	326	EPA	LMB	plug	status	45.3	1472	0.157
1531	326	EPA	LMB	plug	status	45.3	1590	0.116
1532	326	EPA	LMB	plug	status	42.4	1200	0.127
1534	340	EPA	LMB	plug	status	42	1175	0.212
1535	340	EPA	LMB	plug	status	40.1	780	0.271
1536	340	EPA	LMB	plug	status	41.1	665	0.33
1537	340	EPA	LMB	plug	status	40.5	970	0.157
1538	340	EPA	LMB	plug	status	42.1	1130	0.296
1541	350	EPA	WHB	plug	status	33.3	492	0.337
1542	350	EPA	WHB	plug	status	34.5	592	0.121
1543	350	EPA	WHB	plug	status	36.9	678	0.166
1544	350	EPA	WHB	plug	status	35.8	711	0.202
1545	350	EPA	WHB	plug	status	31.8	420	0.139

Appendix E

Complete listing of the 2013 IA RAFT status bottom-feeding fish and turtle sampling results (in mg/kg unless otherwise indicated). See Appendix B for a list of 2013 RAFT site descriptions and Appendix C for a list of fish names and abbreviations.

sample #	site #	Lab	species code	biopart	sample type	mercury	chlordane, technical	dieldrin	mean total length (cm)	mean weight (g)	# sampled	PCB, Aroclor 1248	PCB, Aroclor 1254	PCB, Aroclor 1260	total PCBs (sum Aroclors)[1]
1426	47	SHL	CAP	fillet	status	0.1	<0.2	<0.04	47.5	1460	5	<0.2	<0.2	<0.2	<0.6
1427	101	SHL	SOFT	shoulder	status	0.44	<0.2	<0.04	32.4	3277	3	<0.2	<0.2	<0.2	<0.6
1433	102	SHL	CCF	fillet	status	0.13	<0.2	<0.04	49.1	1462	5	<0.2	<0.2	<0.2	<0.6
1439	109	SHL	CAP	fillet	status	0.13	<0.2	<0.04	48.8	1475	5	<0.2	<0.2	<0.2	<0.6
1444	114	SHL	CCF	fillet	status	0.13	<0.2	<0.04	43.5	649.3	4	<0.2	<0.2	<0.2	<0.6
1455	150	SHL	CCF	fillet	status	0.11	<0.2	<0.04	44.8	728.7	3	<0.2	<0.2	<0.2	<0.6
1461	189	SHL	SOFT	shoulder	status	0.09	<0.2	<0.04	23.6	1177	3	<0.2	<0.2	<0.2	<0.6
1480	269	SHL	CCF	fillet	status	<0.05	<0.2	<0.04	41.1	665	5	<0.2	<0.2	<0.2	<0.6
1486	270	SHL	CAP	fillet	status	0.22	<0.2	<0.04	70.3	4767	3	<0.2	<0.2	<0.2	<0.6
1491	282	SHL	CAP	fillet	status	0.1	<0.2	<0.04	41.1	911	4	<0.2	<0.2	<0.2	<0.6
1497	285	SHL	CCF	fillet	status	<0.05	<0.2	<0.04	49.3	1333	3	<0.2	<0.2	<0.2	<0.6
1503	294	SHL	CCF	fillet	status	0.05	<0.2	<0.04	43	631	5	<0.2	<0.2	<0.2	<0.6
1509	302	SHL	CCF	fillet	status	0.09	<0.2	<0.04	45	849	5	<0.2	<0.2	<0.2	<0.6
1515	306	SHL	CCF	fillet	status	<0.05	<0.2	<0.04	47.8	1043	3	<0.2	<0.2	<0.2	<0.6
1521	310	SHL	CCF	fillet	status	0.06	<0.2	<0.04	56.5	1837	4	<0.2	<0.2	<0.2	<0.6
1527	312	SHL	CCF	fillet	status	0.13	<0.2	<0.04	40.8	579	5	<0.2	<0.2	<0.2	<0.6
1533	326	SHL	CCF	fillet	status	<0.05	<0.2	<0.04	43	782.7	3	<0.2	<0.2	<0.2	<0.6
1539	340	SHL	CCF	fillet	status	<0.05	<0.2	<0.04	44.2	913	5	<0.05	<0.05	<0.05	<0.15
1540	349	SHL	CCF	fillet	status	0.08	<0.2	<0.04	43.8	687.2	5	<0.2	<0.2	<0.2	<0.6
1546	350	SHL	CCF	fillet	status	0.07	<0.2	<0.04	48.1	1017	5	<0.2	<0.2	<0.2	<0.6

[1] Due to the analytical methods used for PCBs, detection levels of the three Aroclors (<0.2 mg/kg) were equal to the IDNR/IDPH advisory trigger level of 0.2 mg/kg. Thus, for a given sample, the sum of the detection levels for the three Aroclors to determine the "total PCB" concentration (<0.6 mg/kg for all but sample 1539) appears well above the 1 meal/week advisory trigger level of 0.2 mg/kg. IDNR will address this laboratory analysis issue for future RAFT samplings.